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On the feasibility of Breed-and-Burn fuel cycles in Molten Salt Reactors

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Reactors able to operate in a Breed-and-Burn fuel cycle can operate at equilibrium with minimum fissile input and fuel processing without actinides separation, making them particularly attractive. Historically, the concept has essentially been considered for solid-fuel fast reactors, in particular to sodium-cooled fast reactors. Their performance in breed-and-burn is however limited by the neutron fluences necessary to reach break-even neutron generation in the fertile feed and their inhomogeneous burn-up. However, molten salt reactors do not suffer from such limitations, but have other constraints due to their homogeneous nature. In this paper, the constraints in term of fuel selection and utilization and reactor dimensions are studied and reported.

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